APPENDIX 3

EYE LEVEL SURVEY

An eye-level survey allows one or two individuals to locate and lay out a trail in hilly terrain. Sometimes called an eye-level flagline, the purpose is to establish a correct grade for the trail. The basic equipment needed is a clinometer and flagging. For a more complete job, or when laying out a trail that will not be constructed for some time, construction stakes, pin flags, and a notebook to record readings are needed.

Step 1: From maps or first-hand knowledge, establish key points where the trail must be located. These include campsites, water sources, scenic vistas, stream crossings, etc.

Step 2: Scout the trail. Determine the best way to get from one major point, identified in step 1, to another. Scouting merely means to begin at the first key point and walk toward the next key point to determine if a route is feasible. This step may involve several attempts before the best route is found. In places, you may want to hang some temporary flagging.

Step 3: If after reaching key point number 2, and a feasible route has been found, flag the trail on the return trip to key point number 1. Flagging should be complete enough so that the construction crew can determine the centerline of the trail. When tying flagging on trees, it is recommended to place the knot so that it is facing the trail. This indicates to the construction crew where you intend the trail to be located in relation to the tree. In areas of gentle topography, simply flag the trail location going by what "feels good" -- considering all important location factors such as drainage, scenery, gentle curves, variety, maintainability of trail, and ease of construction. Eye-level surveying is employed in step number 4.

Step 4: Eye-level surveying is used to maintain the correct grade (generally 7 to10 percent) on hills. If working with a partner, stand face-to-face in a level area. Sight through the clinometer to determine a feature on your partner's body that is level with your eyes by rotating the clinometer to a zero percent reading. This may be your partner's hairline, nose, mouth, shirt pocket, etc. Remember this feature.

The objective is to establish a uniform trail grade from the top to the bottom of the hill. Begin at the top or bottom of the hill by tying a piece of flagging at your eye-level. If working with a partner, the person with the clinometer stays at this position while the partner walks ahead along what appears to be the feasible trail route. As long as the hillside is uniform, the partner can walk as far away as they can be easily seen through the clinometer. If there are undulations in the hillside, the partner should stop at each break in topography. The person with the clinometer sights the eye-level feature of the partner and has them move upslope or downslope until the desired grade (say 8 percent) is read in the clinometer. The clinometer person then walks forward to the partner's position, and hangs another eye-level flag. The process is then repeated until the hill is traversed. If working by yourself, walk forward and take readings on the last eye-level flagging. Move up or down slope until the correct reading (8 percent) is obtained.

Repeat the process using eye-level survey on hills and gut feelings in gentle areas until key point number 1 is reached. If the same people who are laying out trail are doing the construction, no further flagging or staking is necessary. Subsequent steps merely refine the staking of the trail so that a trail construction crew can more easily

determine what is intended, or to identify and record amounts of work for planning the job.

Step 5: Since the eye-level flagging is tied on a tree or limb, it is generally off to the side of the trail's desired centerline. Consequently, the construction crew may have a difficult time placing the trail on the ground exactly as is desired. To eliminate any confusion, at each eye-level flagging location, sight through the clinometer at the previously hung flagging until a reading of 0 percent is established and drive a construction stake into the ground where you are standing. This is the trail's centerline.

Concurrently, the survey can be refined by writing the survey station number on the stake and recording construction information in a survey notebook. From the beginning point, measure to the stake with a steel or cloth tape. For example, if it is 185 feet, record this number on the stake and in a survey notebook as 1 + 85. Measurements to subsequent stakes are added to the previous measurements so that at the end of a mile the stake would read 52 + 80 (5,280 feet from the beginning). Useful information can be recorded in a simple table that meets your needs. An example is shown below.

Station	Percent Grade 1	Clearing Needed 2	Grubbing Needed 3	Excavation Needed	Percent Sidehill
0+00	8	Light	Medium	Light	15
1+85	8	Medium	Medium	Heavy	40
2+50	7	Light	Light	Medium	25

(1) To the next station.

(2) Clearing refers to the amount of trees, saplings, brush, and large fallen logs that need removal.

(3) Grubbing refers to stumps and roots that need to be removed.

Step 6: Use a series of pin flags to show the curvature (centerline) of the trail between the stations.